

DISTORTION - Any shift in the position of an image on a photograph which alters the perspective characteristics of the photograph. Causes of image distortion include lens aberration, differential shrinkage of film or paper, and motion of the film or camera. See **FILM DISTORTION** and **LENS DISTORTION**.

DISTORTION CURVE - A curve representing the distortion characteristics of a lens; it is plotted with image radial distances from the lens axis as abscissas and image radial displacements as ordinates. Image displacements away from the lens axis are considered as positive.

DIURNAL - Having a period of, or occurring in, or related to, a day.

DIVIDE - A ridge or area of elevated land between two basins or valleys.

DIVIDED HIGHWAY - A highway with separated roadways for traffic in opposite directions.

DODGING - The process of holding back light from certain areas of sensitized material to avoid overexposure of these areas.

DOMESTIC MAP - A mapped area of the U.S.A.

DOPPLER EFFECT (Also DOPPLER SHIFT) - Apparent change in frequency of radiant energy (sound waves, or electrical waves) when the distance between the source and the observer or receiver is constantly changing.

DOT GRAVER - A device for drilling a small circular hole for scribing maps.

DOT GRID - Film positive with regularly spaced dots used as an overlay over a photo or map in determining areas.

DOUBLE CENTERING - A method of prolonging a line from a fixed point whereby the backsight is taken with the telescope in the direct position. The telescope is placed in the indirect position and the foresight is made. The point at which the vertical cross-hair intersects the hub is then marked. The transit is then rotated 180° to take a backsight with the telescope in the indirect position, and a second projected point with the telescope in the direct position is marked on the hub. A point midway between the two marked points is the true point on the prolonged line.

DOUBLE-RODDED LINE - A line of leveling wherein two sets of turning points are used to give independent sets of measurements from the same instrument setups.

DRAFTING GUIDE - See **COLOR-SEPARATION GUIDE**.

DRAINAGE - All map features associated with water runoff.

DRAINAGE AREA - The area of a drainage basin.

DRIFT - 1) The horizontal displacement of an aircraft, caused by the force of wind, from the track it would have followed in still air. 2) A special condition of crab wherein the photographer has continued to make exposures oriented to the predetermined line of flight while the airplane has drifted from that line.

DUMPY LEVEL - A leveling instrument with its telescope permanently attached to the vertical spindle or leveling base as a single unit.

DUNE - A hill or ridge of sand formed by transportation by the wind.

DUPLICATING FILM - Sensitized emulsion on transparent base manufactured for the special purpose of duplicating photographs, particularly color photographs.

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EC STATION - 1) Extended control station. 2) Electronic control station.

ER-55 - See later in this section.

ESNA - Electrical Survey Net Adjuster.

ECCENTRICITY - 1) The amount of deviation from a center. 2) Lack of coincidence of the several centers of rotation, circles, and indexes of an instrument. 3) Horizontal displacement of the instrument or signal from the station mark at the time an observation is made. 4) A measure of the relative shape of an ellipse or an ellipsoid.

ECCENTRICITY CORRECTION - The correction that must be applied to an observation made from an eccentric setup (reduction to center) or to an eccentric signal to compensate for eccentricity. See **REDUCTION TO CENTER** and **SWING**.

ECCENTRIC SIGNAL - A signal (target) which is not in the same vertical line with the station which it represents.

EDGE ENHANCEMENT - Image alternation which intensifies the changes between adjacent areas.

EDITING - Checking a map in its stages of preparation to insure correct interpretation of the sources used and precise reproduction.

EFFECTIVE FOCAL LENGTH (USGS) - The adjusted value of the focal length of a lens which best fulfills the geometric conditions of a given photogrammetric operation. In making diapositive plates, the settings of the printer are based on the effective focal length derived from the calibrated focal length and further adjusted to allow for film distortion. In photoalidade operation, the effective focal length is the setting of the focal-length scale which best brings a specific photograph into proper geometric perspective. The preferred expression for this value is "*principal distance*."

ELECTRICAL SURVEY-NET ADJUSTER - A panel containing a number of adjustable resistances and d-c power sources for adjustment of survey data.

ELECTROMAGNETIC RADIATION - Energy propagated through space or through a material medium as waves or variations of electric and magnetic fields; known as radio waves, heat waves, light waves, etc., depending upon frequency. Also called electromagnetic energy.

ELECTROMAGNETIC SPECTRUM - Ordered array of known electromagnetic radiations, extended from the shortest cosmic rays, through gamma rays, X-rays, ultraviolet radiation, visible radiation, infrared radiation, and including microwave and all other wavelengths of radio energy.

ELECTRONIC COLOR COMBINER - An instrument which produces false color image by linearly combining a few black-and-white films of the same scenes. The films are usually obtained from multiband and time-sequential photography. The films are put in synchronized flying spot scanners, the resulting video signals are linearly combined through a matrix multiplier circuit, and the three linearly combined signals then drive the color gun of a color TV tube. An electronic color combiner usually has greater versatility for congruencing or registering.

ELECTRONIC DISTANCE MEASUREMENT (EDM) - Measurement made with devices that compare the phase difference between transmitted and returned (i.e., reflected or retransmitted) electromagnetic waves, of known frequency and speed, or the round-trip transit time of a pulsed signal, from which distance is computed.

ELECTRONIC TRAVERSE - A traverse in which the angles are measured with a direction theodolite and distances with an electronic distance-measuring instrument.

ELEVATION - The vertical distance from a datum, generally mean sea level, to a point or object on the earth's surface. The terms "*elevation*" and "*altitude*" have sometimes been used synonymously, but in modern surveying practice the term "*elevation*" is preferred to indicate heights on the earth's surface whereas "*altitude*" is used to indicate the heights of points in space above the earth's surface. See FIELD ELEVATION, SPOT ELEVATION and CHECKED ELEVATION.

ELEVATION METER - A mechanical or electromechanical device on wheels that measures slope and distance and automatically and continuously integrates their product into difference elevation.

ELEVATION TINT - The layer of color between selected contours, according to altitude. This is a method of obtaining a mental picture of the terrain more readily.

ELEVATION TONES - A method of accentuating the elevation expressed by contours through the use of colors or different tones of the same color.

ELLIPSOID - The surface generated by rotation of an ellipse about one of its axes.

ELLIPSOIDAL REFLECTOR - A mirror surface which conforms to a portion of an ellipsoid of revolution. See ER-55 PLOTTER.

EMISSION - With respect to electromagnetic radiation, the process by which a body emits electromagnetic radiation as a consequence of its temperature only.

EMULSION - A suspension of a light-sensitive material in gelatin, used for coating photographic film, plates, or papers.

ENCODER - A mechanism usually attached to the output of a measuring device (or photogrammetric instrument) which converts movements into digital information. See DIGITIZING.

ENDLAP - Progressive forward overlap of aerial photos along the line of flight.

ENGINEERING MAP - A map showing information that is essential for planning an engineering project or development. An engineering map is generally a large-scale map of a comparatively small area or of a route. It may be entirely the product of an engineering survey, or reliable information may be collected from various sources and delineated on a base map.

ENGINEERING SURVEY - The process of collecting and recording information for planning an engineering project.

ENGINEER'S LEVEL - A precision leveling instrument for establishing horizontal line of sight, used to determine differences of elevation.

ENHANCEMENT - Various processes and techniques designed to render optical densities of imagery more susceptible to interpretation.

EPHEMERIS (PLURAL EPHEMERIDES) - A tabulation of positions and related data for a celestial body for given dates at uniform time intervals. Also, a publication containing such data for a number of celestial bodies. See EMPHEMERIS*.

EPOLAR PLANE - Any plane containing the air base.

EQUALITY - Equality or equation in station numbers arises when a single point on a route alignment has two values. Thus station $123 + 45.6$ ahead = $123 + 54.3$ back.

EQUATION - 1) A statement of equality of the same point on a route survey which has two values. 2) One of a set of simultaneously solved equality statements which adjust for fixed conditions of length, angles, azimuth or position in least squares adjustment. See EQUALITY.

EQUIVALENT FOCAL LENGTH - The distance measured along the lens axis from the rear nodal point to the plane of best average definition over the entire field used in the aerial camera.

ER-55 PLOTTER - A stereoscopic plotting instrument of the direct-viewing, double projection type, characterized by the use of reduced size diapositives and an ellipsoidal-reflector illumination system in which the light source is at one focus of the ellipsoidal surface and the projector lens is at the other, producing optimum illumination of the entire image area of the diapositive. The principal distance of the projectors is 55 mm. The commercially manufactured version of this plotter is the Balplex.

ERROR - A class of small inaccuracies due to imperfections in equipment or techniques, surrounding conditions, or human limitations; not to be confused with blunders or mistakes. See ACCIDENTAL ERROR, AVERAGE ERROR, CONSTANT ERROR, COMPENSATING ERROR, INDEX ERROR, INSTRUMENTAL ERROR, PERSONAL ERROR, PROBABLE ERROR, MEAN ERROR, RANDOM ERROR, ROOT MEAN SQUARE ERROR, STANDARD ERROR, and SYSTEMIC ERROR.

ERROR OF CLOSURE - The amount by which a value of quantity obtained by surveying operations fails to agree with a fixed or theoretical value of the same quantity.

ERROR OF THE MEAN - The resultant error of the mean or average of a number of quantities. It is the quotient of the algebraic sum of the errors divided by the number of errors included.

ESTUARINE - Of, or pertaining to, or formed in a estuary.

ESTUARY - Drainage channel adjacent to the sea in which the tide ebbs and flows. Some estuaries are the lower courses of rivers or smaller streams, others are no more than drainage ways that lead seawater into and out of coastal swamps.

ETCHED DRAWING - A color-separation negative produced by a photomechanical process. See PHOTOMECHANICAL ETCHING.

ETCHING - See PHOTOMECHANICAL ETCHING.

EXPOSURE - 1) A photograph. 2) The control of light in making a photograph. Exposure-data refers to camera shutter and aperture settings, together with light intensity measurements, filter factors, and all such controls of light reaching the film.

EXPOSURE INTERVAL - The time interval between taking successive photographs.

EXPOSURE STATION - The point in space occupied by the camera lens at the time of taking the picture.

EXTENDED CONTROL STATION - A described and monumented point established as a basis of subsidiary surveys, usually for Airborne Control System use. Triangle figures or electronic traverses are used to establish position based on higher order surveys in nearby areas.

EXTENSION OF CONTROL - Surveys executed to establish additional control from existing control.

EXTERIOR NODE - See NODAL POINTS.

EXTERIOR PERSPECTIVE CENTER - See NODAL POINTS.

EXTRAPOLATE - To calculate the value of a function lying beyond an interval from values of the function within that interval. In topographic surveys extrapolation is used in estimating the elevation of a point so situated that the elevation cannot be interpolated between two contour lines..

EYE BASE - The distance between the pupils of the eyes of an individual; also called interpupillary distance or interocular distance.

EYEPiece - The lens or combination of lenses at the observing end of one optical distance.

EYOTT - A small island arising in a river.

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